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WEITERE INFORMATIONEN OK

Wednesday, February 09, 2011

Great stagnation or external growth?

Tyler Cowen posits that we are going through a Great Stagnation. Civilization has harvested the low hanging fruit of the internal combustion engine, electricity, and so on that drove great increases in value and productivity from the end of the nineteenth century. But we have made so few similarly productive discoveries in recent decades that as a result progress is slowing down. Markets have thus overestimated economic growth, resulting in the dot-com bubble and crash and the more recent market problems as real estate prices failed to keep pace with expectations. This thesis echoes much that Peter Thiel and others have been saying, that the financial industry has, in its expectations about financial returns, been counting on 20th century levels of economic growth in the developed world but instead has hit the reality of lower growth rates here, resulting in market volatility and drops.

These pessimistic observations of long-term economic growth are in many ways a much needed splash of cold water in the face for the Kurzweilian "The Singularity is Near" crowd, the people who think nearly everything important has been growing exponentially. And it is understandable for an economist to observe a great stagnation because there has indeed been a great stagnation in real wages as economists measure them: real wages in the developed world grew spectacularly during most of the 20th century but have failed to grow during the last thirty years.

Nevertheless Cowen et. al. are being too pessimistic, reacting too much to the recent market problems. (Indeed the growing popularity of pessimistic observations of great stagnations, peak oil, and the like strongly suggest it's a good time to be long the stock markets!) These melancholy stories fail to take into account the great recent increases in value that are subjectively obvious to almost all good observers who have lived through the last twenty years but that economists have been unable to measure.

In many traditional industries, such as transportation and real estate, the pessimistic thesis is largely true. The real costs of commuting, buying real estate near where my friends are and where I want to work, of getting a traditional college education, and a number of other important things have risen significantly over the past twenty years. These industries are going backwards, becoming less efficient, delivering less value at higher cost: if we could measure their productivity it would be falling.

On the other hand, the costs of manufacturing goods whose costs primarily reflect manufacturing rather than raw materials has fallen substantially over the least twenty years, at about the same rate as in prior decades. Of course, most of these gains have been in the developing and BRICs countries, for a variety of reasons, such as the higher costs of regulation in the developed world and the greater access to cheaper labor elsewhere, but those of us in the U.S., Europe and Japan still benefit via cheap imports that allow us to save more of our money for other things. But perhaps even more importantly, outside of traditional education and mass media we have seen a knowledge and entertainment sharing revolution of unprecedented value. I argue that what looks like a Great Stagnation in the

About Me

Nick Szabo

"A premier thinker about history, law and economics, and the lessons they have for security." -- Adam Shostack, Emergent Chaos

"Szabo comes out with these essays that leave me in awe." -- Brian Dunbar

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traditional market economy is to a significant extent a product of a vast growth in economic value that has occurred on the Internet and largely outside of the traditional market economy, and a corresponding cannibalization of and brain drain from traditional market businesses.

Most of the economic growth during the Internet era has been largely unmonetized, i.e. external to the measurable market. This is most obvious for completely free services like Craig's List, Wikipedia, many blogs, open source software, and many other services based on content input by users. But ad-funded Internet services also usually create a much greater value than is captured by the advertising revenues. These include search, social networking, many online games, broadcast messaging, and many other services. Only a small fraction of the Internet's overall value has been monetized. In other words, the vast majority of the Internet's value is what economists call an externality: it is external to the measurable prices of the market. Of course, since this value is unmeasured, this thesis is extremely hard to prove or disprove, and can hardly be called scientific; mainly it just strikes me as subjectively obvious. "Social science" can't explain most things about society and this is one of them.

What's worse for the traditional market (as opposed to this recent tsunami of unmonetized voluntary information exchange), this tidal wave of value has greatly reduced the revenues of certain industries. The direct connection the Internet provides between authors and the readers put out of business many bookstores. Online classifieds and free news sources have cannibalized newspapers and magazines. Wikipedia is destroying demand for the traditional encyclopedia. Free and cut-price music has caused a substantial decline in music industry revenues. So the overall effect is a great increase in value combined with a perhaps small, but I'd guess significant reduction in what GDP growth would have been without the Internet.

What are some of the practical consequences? Twenty years ago most smart people did not have an encyclopedia in the home or at the office. Now the vast majority in the developed and even hundreds of millions in the BRICs countries do, and many even have it in the car or on the train. Twenty years ago it was very inconvenient and cost money to place a tiny classified ad that could only be seen in the local newspaper; now it is very easy and free to place an ad of proper length that can be seen all over the world. Search engines combined with mass voluntary and generally free submission of content to the Internet has increased the potential knowledge we have ready access to thousands-fold. Social networking allows us to easily reconnect with old friends we'd long lost contact with. Each of us has access to much larger libraries of music and written works. We have access to a vast "long tail" of specialized content that the traditional mass media never provided us. The barriers to a smart person with worthwhile thoughts getting fellow humans to attend to those thoughts are far lower than what they were twenty years ago. And almost none of this can be measured in market prices, so almost none of it shows up in the economic figures on which economists focus.

Cowen suggests that external gains of similar magnitude occurred in prior productivity revolutions, but I'm skeptical of this claim. A physical widget can be far more completely monetized than a piece of information, because it is excludable: if you don't pay, you don't get the widget. As opposed to information that computers readily copy. (The most underappreciated function of computers is that they are far better copy machines than the paper copiers). It's true that competition drove down prices. But the result was still largely monetized as greater value caused increased demand, whereas growth in the use of search engines, Twitter, Wikipedia, Facebook etc. largely just requires adding a few more computers that now cost far less than the value they convey. (Yes, I'm well aware of scaling issues in software engineering, but they typically don't require much more than a handful of smart computer scientists to solve). Due to Moore's Law the computers that drive the Internet have radically increased in functionality per dollar since the dawn of the Internet. Twitter's total capital equipment purchases, R&D, and user acquisition expenditures are less than fifty cents per registered user and these capital investment costs per user continue to drop at a ferocious rate for Internet businesses and non-profits.

The brain drain from traditional industries can be seen in, for example, the great increase in the proportion of books on computer programming, HTML, and the like on bookstore shelves to traditional engineering and technical disciplines from mechanical engineering to plumbing. It is not so blatant in the relative growth of computer science and electrical engineering relative to other engineering disciplines, but that's just the tip of the iceberg and vast numbers of non-computer scientists, including many with engineering degrees or technical training in other areas, have ended up as computer programmers.

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Fortunately, the Internet is giving a vast new generation of smart people access to knowledge who never had it before. The number of smart people who can learn an engineering discipline has probably increased by nearly a factor of ten over the last twenty years (again largely in the BRICs and developing world of course). The number who can actually get a degree of course has not -- which gives rise to a great economic challenge -- what are good ways for this vast new population of educated smart people to prove their intelligence and knowledge when traditional education with its degrees of varying prestige is essentially a zero-sum status game that excludes them? How do we get them in regular social contact with more traditionally credentialed smart people? The Internet may solve much of the problem of finding fellow smart people who share our interests and skills, but we still emotionally bond with people over dinner not over Facebook.

As for the great stagnation in real wages in particular, the biggest reason is probably the extraordinarily rapid pace at which the BRICs and developing world has become educated and accessible to the developed world since the Cold War. In other words, outsourcing has in a temporary post-Cold-War spree outraced the ability of most of us in the developed world to retrain to the more advanced industries. The most unappreciated reason, and the biggest reason retraining for newer industries has been so difficult, is that unmonetized value provides no paying jobs, but may destroy such jobs when it causes the decline of some traditionally monetized industries. On the Internet the developed world is providing vast value to the BRICs and developing world, but that value is largely unmonetized and thus produces relatively few jobs in the developed world. The focus of the developed world on largely unmonetized, though extremely valuable, activities has been a significant cause of wage stagnation in the developed world *and* of skill and thus wage increases in the developing world. Whereas before they were buying our movies, music, books, and news services, increasingly they are just getting our free stuff on the Internet. The most important new industry of the last twenty years has been mostly unmonetized and thus hasn't provide very many jobs to retrain for, relative to the value it has produced.

And of course there are the challenges of the traditional industries that gave us the industrial revolution and 20th century economic growth in the first place. Starting with the most basic and essential: agriculture, extraction, and mass manufacturing. By no means should these be taken for granted; they are the edifice on which all the remainder rests. Gains in agriculture and extraction may be diminishing as the easy pickings (given sufficiently industrial technology and a sufficiently elaborated division of labor) of providing scarce nutrients and killing pests in agriculture and the geologically concentrated ores are becoming history. Can the great knowledge gains from the Internet be fed back to improve the productivities of our most basic industries, especially in the face of Malthusian depletion of the low hanging fruit of soil productivity and geological wealth? That remains to be seen, but despite all the market troubles and run-up in commodity prices, which have far more to do with financial policies than with the real costs of extracting commodities, I remain optimistic. We still have very large and untapped physical frontiers. These tend to be, for the near future, below us rather than above us, which flies in the face of our spiritual yearnings (although for space fans here is the most promising possible exception to this rule I have encountered). The developing world may win these new physical frontiers due to the high political value the developed world places on environmental cleanliness, which has forced many dirty but crucial businesses overseas. Industries that involve far more complex things, like medicine and the future of the Internet itself, are far more difficult to predict. But the simple physical frontiers as well as the complex medical and social frontiers are all there, waiting for our new generations with their much larger number of much more knowledgeable people to tap them.

Posted by Nick Szabo at 4:57 PM

20 comments:

Tonio said...

Sounds like someone projecting the last two years forward to infinity, which is just chartism (and really, really bad chartism).

Just before the internet bubble crashed, WIRED's cover story was "the long boom" and argued for the boom continuing forever for exactly the flipside of the arguments quoted.

I'd suggest we haven't even seen the _beginning_ of the impact of the web and broadband on society -- one tiny aspect of which is broad and deep skill-sharing (seen the TED story about kids learning dance moves from each other all over the world via Youtube? The same thing is happening with programmers and 3d modelers and in a hundred thousand other niches).

Next time you visit a doctor and fill in five pages of forms full of stuff the people you're giving the form to already know, ponder the low hanging fruit waiting to be plucked.

1:20 PM

Hieronymus Goat said...

Indeed technology produces the lower cost of every thing mechanical, and now the zero marginal cost of knowledge creation and copying, and social and political organization. Individuals are closer to a full, instant access library on any published subject. Small groups have larger power, by the implementation of the computer, the greatest factory at the lowest capital ever.

8:15 PM

Hieronymus Goat said...

@Tonio The form at the doctor is caused by bureaucratic excess, not technical inability. If bureaucrats are going to be obnoxious, they are enabled not impaired by improved technology.

The author's emphasis on examples of casual vulgar social networking sites may be shortsighted, but the main points are correct.

Google Books alone is a tool exceeded only by the printing press, unless you already live at Harvard or the Library of Congress.

8:31 PM

Anonymous said...

Very interesting! There is a new documentary out, PressPausePlay, about "Fear, Hope and Digital Culture". And these two camps of pessimists vs optimists are clearly defined on the Internet. Which of them is right, future will decide...

4:51 AM

nick said...

Addendum: globalism and the brain drain towards innovation at the high end of Maslow's hierarchy (knowledge for its own sake, entertainment, socializing -- the stuff that dominates the Internet) and away from the lower levels (agriculture, extraction, manufacturing) go together. There has been strong disincentive to innovate, especially in automation, in the Maslovian mundane industries when globalization and the last half century of BRICS population growth has made accessible to the world economy so many more inexpensive hands. So I'd attribute much of the brain drain from traditional engineering to software engineering to, ironically, the lack of incentive to automate. In particular to automate jobs dominated by physical motion, which can be done so cheaply by all those new hands. Another part of the brain drain I'd attribute to a simple subjective response young people have to the tremendous new value being provided by the Internet in contrast to other industries, and to the most dramatic entrepreneurial wealth accruing there, even though the median wage for brain work in these higher reaches of Maslow's hierarchy is no better and the risks are much higher. The result is similar to, albeit not as extreme as, how young people overestimate the financial rewards and underestimate the risks of acting and professional sports.

BTW I quite disagree with Cowen when he says we need more "science." That is academic inbreeding talking. In fact, the number of scientific papers has been growing exponentially since 1973, during the entire period Cowen sees innovation as having declined, and government funding of science has also rapidly increased during this period. Mountains of papers where academicians compete to show off and praise each other's IQs does not create innovation. Indeed, it creates another brain drain from actually valuable innovation. The problem with the non-IT/non-Internet portions of the economy has been these brain drains from traditional engineering to other pursuits, and what is needed to return to innovation is more people pursuing practical engineering as well as semi-technical fields like plumbing, electricians, etc. The latter, not people with advanced degrees, were the main sources of innovation during the early and later (late 19th-early 20th century) industrial revolutions. Science, real science that actually discovers useful stuff, is very important, but only a relatively few geniuses in the hard sciences (physics and chemistry) and the more difficult, but still tractable and economically crucial ones (esp. biology) are needed to drive innovation where it is most needed, further down in Maslow's hierarchy. The vast majority of innovation in all parts of Maslow's hierarchy has and will come from engineers, computer scientists, and practical technicians, as well as social innovations from entrepreneurs, lawyers, etc. Even in theoretical physics we need far less pure theory and far more people who start out thinking about practical technology, like Einstein who started out reading patents.

(to be continued)

4:55 PM

nick said...

(continuing)

Nor is innovation the only thing necessary for economic health -- even more important is preserving our already highly evolved institutions, especially in scientifically intractable social areas, from naive innovation in the name of cargo-cult science. The main output of post-Sputnik "science" has not been innovation but rather a blizzard of regulations that have helped drive extraction and manufacturing out of developed countries.

So to summarize there have been least four sources of the brain drain from the engineering and other technical fields which produced higher rates of innovation in agriculture, extraction, transport, and manufacturing in the past:

(1) increasing education of and access to cheap BRICs and developing world labor and a resulting poor incentive to automate the basic industries;

(2) a "basketball star" effect that makes the Internet look more lucrative to young people than it really is (as with professional sports or acting where a handful of high-salary stars dominate the news);

(3) the radically increased government funding of "science" post-Sputnik and the resulting explosion of useless, cargo-cultish IQ contests again at the expense of engineering and other practical and innovation-producing pursuits; and

(4)a blizzard of "science"-based environmental, safety, etc. regulations that has driven many extraction and manufacturing industries out of the developed world, in response to the plethora of moral panics (regarding health, environment, climate, etc.) based on "science", i.e. based on scare stories reviewed by fellow cargo-cult science members (to use Feynman's apt phrase) and thus "consensus science" that outsiders are expected to accept on blind faith.

(to be continued)

5:09 PM

nick said...

(continuing)

As world population growth falls, we will see a return of incentives to innovate in automation (which for simplicity we can think of as robots, although in reality will be almost entirely non-anthroporphic and highly specialized machines that do many unhuman jobs and operate at very superhuman rates). And we will see a returning emphasis on the hard dirt, the physical frontiers, although it will largely be poorer people who value their livelihoods over politically enforced environmental cleanliness who will pursue these frontiers.

So populations that are poor and risk-taking yet smart will be the leading innovators. And the vast virgin territories they will exploit are largely below our feet, not in the heavens of space fans. If our planet is a pool ball, then we have barely started to scratch its surface.

Despite these efforts being driven by the poorer democracies, which will unlike the spoiled rich countries decline to effectively ban physical frontiers through draconian regulations, there will be plenty of demand for automation engineering from wherever that talent can be found, demand for what simplistic anthropomorphizing might call robotic engineering. We have seen a revolution in computation. We are entering into a revolution in sensors so that our "robots" will "see", "hear", "taste" and "smell" far more than they do today.

For the future remain innovations in effectors so that our hyperspecialized robots will manipulate far more of the world, much of it many kilometers below the earth's surface, below both land and sea. The cities of the more daring and less spoiled will also be increasingly vertical, up into the skies with stronger materials and down hundreds of meters below our cities and suburbs in vast new tunnels for trains, shopping malls, dirty manufacturing, hotels, apartments, condos, and much more. Earthsteading anyone?

It should be remembered that a crucial part of the industrial revolution -- a concurrent revolution which occurred before, during, and after the more famous revolution of gears and steam -- was an agricultural revolution, which freed up workers to move from agriculture to industry. Similarly, an important part of future growth is freeing manufacturing workers to work higher up in Maslow's hierarchy, be that polishing nails or programming computers to increase our socializing, knowledge, and entertainment. And as we deplete the low-hanging fruit of agricultural chemistry and geology we have to run a kind of Red Queen race in agriculture and extraction, keeping innovation at a pace sufficient for productivity in those most crucial and basic of areas to not decline.

BTW in responsse to H. Goat, I agree with your comments except that socializing is hardly a "shallow" pursuit. It is important not only for the happiness of the vast majority of people but also for many practical purposes, including the team-building that is indispensable to almost all entrepreneurship and innovation. How do smart people, with interests in the appropriately complementary specialties, find each other, prove to each other they have the needed talents, bond, and form productive teams? That is tens of trillions of dollars worth of question.

5:24 PM

Kevembuangga said…

@nick

Your soaring paean to a return to valuable innovation sounds very much like the goals of the Singularity devotees except at a reasonable pace and without the "AI scare".

You are clearly making the case for science's diminishing marginal returns but I haven't found any reference to Joseph Tainter in your blog.
Don't you think that waste disposal and energy resources might be a problem even if "population growth falls"?
More precisely, in your opinion, will a more restricted availability of energy hampers or bolsters "valuable innovation"?

6:04 AM

Murat said...

Great article. In one of my blog posts, I tried to imagine how payments in the new world could work. We need to be able to monetize exchanges taking place in our new economy.

http://bit.ly/fwKiMV

11:28 AM

nick said...

Kevembuangga,

Thoughtful comments as usual. I haven't heard of Joseph Tainter, thanks for the ref I'll take a look at his stuff. Per your points:

(1) waste disposal problems that are prerequisites for the existence of civilization are easy. Only a few such problems that are luxuries are actually hard, with the possible exception of CO2 emissions in the long term.

(2) as for energy resources, see my link above to my essay "Mining the Vasty Deep". We have barely scratched the surface of this billiard ball we live on. Also, I suspect the main barrier to cheap nuclear energy are the severe regulations of spoiled rich countries, which puts it along with physical frontiers in the category of things that will be exploited by poor-but-smart people while the wealthy-but-stupid keep trying to regulate it out of existence. So if the BRICs countries reduce the growth of their CO2 outputs (which I don't expect them to do) they can fairly easily switch to nuclear energy over the next 50 years. Only the wealth-but-stupid countries that regulate all the very good but dirty sources of energy (oil, coal, nuclear) into oblivion are screwed unless solar becomes economical (which is possible) or there is some breakthrough in fusion.

The only possible exception to (1) above is CO2 emissions, which I consider a long-term not a short-term problem, for various reasons too tedious to fit into a comment (and I'm not a climate expert, but my comments on the unadmitted complexity and poor incentives of much of modern "science" probably apply there too).

If, highly improbably, energy prices in terms of gold quadruple over the long term, we'll have to return to an economy similar to that of about 1920 (or China just two decades ago) with most transportation by bicycle and having to get much more out of much smaller IC engines. But gasoline would have to get over an order of magnitude more expensive before we'd have to go back to horses, bicycles, steam and sails, but even that is doable. We had a very advanced civilization in 1870 based on horses, steam and sail. It would be awful -- we'd consider it a very stinky and poverty-ridden way to live compare to today -- but it wouldn't be a threat to civilization. But all that is extremely unlikely, as gasoline prices even doubling in terms of gold over the next thirty years, absent draconian regulations or taxes, is improbable. The much more likely outcome is that, given a fair and free market, the prices of gasoline and near substitutes (e.g. methanol) will fall significantly over the next 50 years (conditional on absence of draconian regulations/taxes).

Murat, I'm not sure I fully understand your proposal but the part that makes sense sounds similar to a proposal I made to combine tipping with social network rating schemes like Digg/Reddit and "Like" buttons. The main barrier to easy payments is mental transaction costs:

http://szabo.best.vwh.net/micropayments.html

People don't want to have to keep track of lots of tiny donations, they want to make a handful of large ones and then get on with the rest of their lives.

How about an online organization of like-minded people that consists of two classes: (1) raters and (2) philanthropists. The philanthropists donate based on how the raters vote (i.e. on what they "Like"), similar to the idea of grant-matching. Only the top vote-getters get anything at all, but that a sizable amount. This saves philanthropists effort since they use like-minded friends to do their selecting for them. The main drawback I can see is that voting is so cheap it doesn't have same commitment signal that fellow philanthropist's donations do in grant-matching. But it may be sufficient if restricted to like-minded friends.

5:23 PM

Murat said...

nick, I was trying to design a system very similar to Facebook "like" or Twitter "retweets" except the system is global not tied to a system, and is backed by government. Basically you can give a certain amount of digital money (within certain limits) to anyone. Anyone, any human can give.

"Received" digital money can be converted to real money through an exchange rate that the government specifies, gov allocates a pool of money to correspond to the digital money flowing in the system.

6:31 AM

blastomere said...

""Received" digital money can be converted to real money through an exchange rate that the government specifies, gov allocates a pool of money to correspond to the digital money flowing in the system."

Why not just use dollars or euros directly?

3:17 PM

Murat said...

Because you need to have euros or dollars to spend it first. Anyone will be able to "give" this new digital money that I call goodwill dollars (GWD), then received GWD can be turned into real money through an exchange rate.

6:07 PM

blastomere said...

I see, like food stamps, except it's Philanthropy Stamps, so that poor people can pretend to be good too.

10:33 PM

Kevembuangga said...

@Murat
Anyone will be able to "give" this new digital money

Thus anyone will be able to game the system (kinda food stamps trafficking).
I really don't see the purpose of this scheme.

12:00 AM

Murat said...

Limits on giving can be imposed (1 GWD a day, per person), and detecting cliques of quid-pro-quo payment structures are also possible.

What this system will do is to pull all activity that is entirely outside the pay economy right now, inside the monetary economy. By giving GWD, people also cause an increase in the reputation of someone, and it's valueable to have this measurement, even if there

was no money involved in the picture.

3:33 AM

Murat said...

@blastomere did i detect little sarcasm in your answer? ;) in any case, yes GWD would be a kind of philantrophic giving, with the difference being that people can generate GWD out of thin air (similar to FB 'like', or retweeting, or up-voting someone's answer on Stackoverflow).

5:01 AM

blastomere said...

So taxes are "thin air?" I guess they are if you're not the one paying them...

I gotta admit I've heard many left-wing economic ideas that are worse than this one. Not that that's a compliment.

1:56 PM

Anonymous said...

The internet is good for sharing information. For producing information, I'm not sure it's so helpful. People treat the sharing of information and the production of information as though they are the same. But to some extent they are inversely correlated. The really good information often takes a lot of hard work to produce. If there is no way to control the spread of that information (i.e. by charging for it) then there is no way that people can afford to devote their lives to producing it.

8:02 AM

Anonymous said...

One area that has definitely stagnated is music. 2000-2010 was a decade of very little musical innovation. What music is there around today that would have sounded out of place ten years ago? Even from 1990-2000 there would be some examples. 1960-1970 was probably the peak decade of musical innovation in the last 70 or so years, with a decline every decade since then.

According to theory, the internet should have spawned an enormous amount of musical creativity but in fact it has not. It has been great at sharing music that was produced in the pre-internet age, though.

8:07 AM

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